

Lab 10

Generating Random Numbers

GOALS:

1. Students will be able to generate Random numbers.
2. Students will be able to create MsgBox in a program.

ESSENTIAL QUESTIONS:

1. How can you use the Random function to generate numbers to simulate a roll of a die?
2. How can a user input more than one value from the keyboard using one variable?

RANDOM NUMBERS:

To generate random numbers, we use the Rnd function. The Rnd function generates a number from 0 to 1 but does not include 1. $0 \leq \text{Rnd} < 1$. Rnd is a built in function meaning that it already exists. We use the **Randomize statement in the Form load procedure**. The Randomize statement makes sure the Rnd function generates different numbers.

To generate a range of numbers we use the following formula:
 $(\text{HighNumber} - \text{LowNumber} + 1) * \text{Rnd} + \text{LowNumber}$

If you want the range generate Integers only we use the following:
 $\text{Int}((\text{HighNumber} - \text{LowNumber} + 1) * \text{Rnd} + \text{LowNumber})$

Int() – function returns the Integer portion of a number without rounding. The number or variable representing a number is place between the parentheses of the Int() function. There also exist a Fix() function that is similar to Int(). Int() & Fix() works the same for positive numbers. The only difference is when it comes to negative numbers. Fix() returns the first negative Integer that is greater than or equal to the argument (the number between the parentheses. Example: $\text{Fix}(-5.4) \rightarrow -5$ and $\text{Int}(-5.4) \rightarrow -6$.

PRACTICE:

1. Create the following program that outputs numbers between 10 - 30

Option Explicit

Private Sub Form_Load()

Randomize

'Notice the Randomize statement is in the form load procedure.

End Sub

Private Sub cmdRandomNumbers_Click()

lblRandomNum1.Caption = Int(21 * Rnd + 10)

lblRandomNum2.Caption = Int(21 * Rnd + 10)

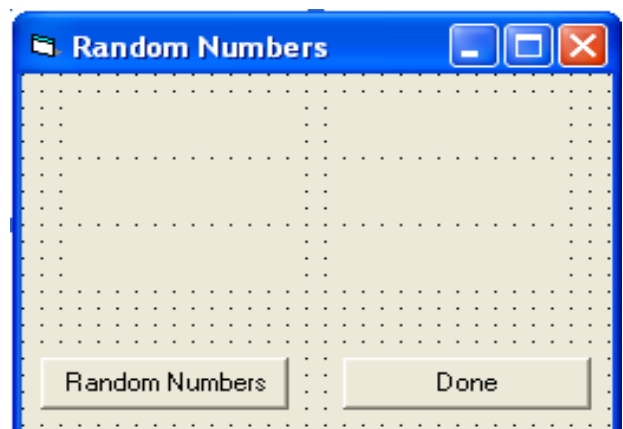
lblRandomNum3.Caption = Int(21 * Rnd + 10)

lblRandomNum4.Caption = Int(21 * Rnd + 10)

lblRandomNum5.Caption = Int(21 * Rnd + 10)

lblRandomNum6.Caption = Int(21 * Rnd + 10)

End Sub



```
Private Sub cmdDone_Click()
```

```
    Unload Me
```

```
End Sub
```

QUESTIONS

1. What would be the results if you remove the Int() from the code above?
2. What must you change in the formula above to output a range from 1 to 6 that represents a roll of a die?

SCOPE of a Variable

The scope of a variable or constant refers to its accessibility among procedures. Local variables are variables declared in the procedure between sub and end sub. Local variables can only be used in the procedure they are declared in, meaning that another click event object can use the variable different to the one it was declared in. All local variables are temporary which means when another button is click all variables memory location gets wiped cleaned of the previous button. Global variables are declared at the top of the program and not in a procedure. All procedures (Aka buttons) have access to it and can change it. Global variables are permanent, meaning that the variable doesn't lose its value when another button is clicked. **Global variables are declared private instead of with a Dim statement.**

Example:

Option Explicit

```
private intTotal as Integer
```

PROGRAM 2

1. Create the following program

Option Explicit

```
Private intSecretNum As Integer
```

```
Private Sub Form_Load()
```

```
    Randomize 'Initialize random number generator
```

```
    intSecretNum = Int(50 * Rnd + 1) 'Generate a number between 1 and 50
```

```
End Sub
```

```
Private Sub txtGuess_Change()
```

```
    lblGuessCheckedMessage.Caption = ""
```

```
End Sub
```

```
Private Sub cmdCheckGuess_Click()
```

```
    Dim intGuess As Integer
```

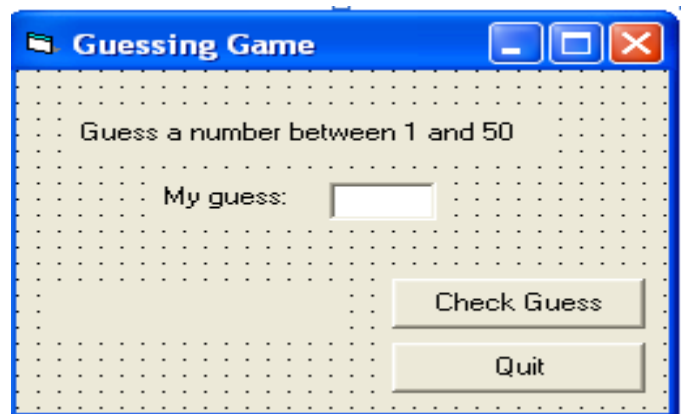
```
    intGuess = txtGuess.Text
```

```
    If intGuess = intSecretNum Then
```

```
        lblGuessCheckedMessage.Caption = "You guessed it!"
```

```
    ElseIf intGuess < intSecretNum Then
```

```
        lblGuessCheckedMessage.Caption = "Too low."
```



```

Else
    lblGuessCheckedMessage.Caption = "Too high."
End If
End Sub

```

```

Private Sub cmdQuit_Click()
    Unload Me
End Sub

```

QUESTIONS:

1. Why was the secret number generated in the form_load() procedure?
2. What is the major difference between the Local and Global variables?

PROGRAM 3

1. Edit the above program to incorporate the range out of bounds error

Option Explicit

```
Private intSecretNum As Integer
```

```

Private Sub Form_Load()
    Randomize ' Initialize random number generator
    intSecretNum = Int(50 * Rnd + 1) ' Generate a number between 1 and 50
End Sub

```

```

Private Sub txtGuess_Change()
    lblGuessCheckedMessage.Caption = ""
End Sub

```

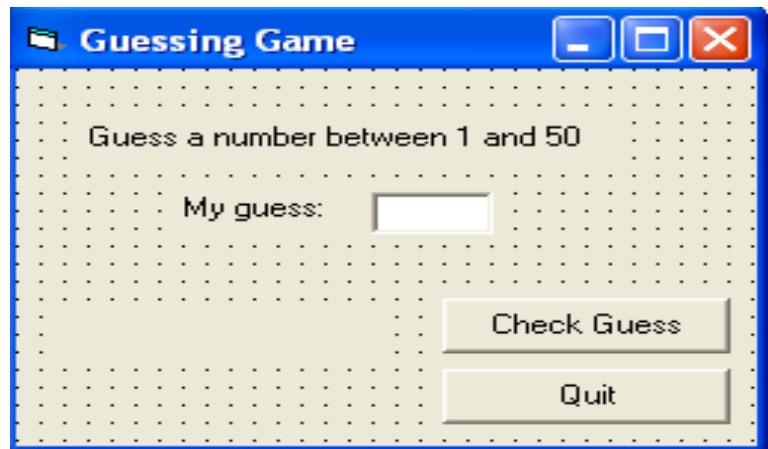
```

Private Sub cmdCheckGuess_Click()
    Dim intGuess As Integer
    intGuess = txtGuess.Text

    If intGuess < 1 Or intGuess > 50 Then
        MsgBox "Guess out of range"
    ElseIf intGuess = intSecretNum Then
        lblGuessCheckedMessage.Caption = "You guessed it!"
    ElseIf intGuess < intSecretNum Then
        lblGuessCheckedMessage.Caption = "Too low."
    Else
        lblGuessCheckedMessage.Caption = "Too high."
    End If
End Sub

```

```
Private Sub cmdQuit_Click()
```



Unload Me
End Sub

QUESTIONS:

1. What would happen if all the if's and elseif's were true?
2. What is the purpose of the MsgBox function in the If statement?
3. Why was intSecretNum declared as a Global?

.....
PROGRAM 4

LOGICAL OPERATORS

There are 3 logical operators AND, OR, and NOT. They are used to join Boolean Expression to form a True or False statement.

AND

For the logical operator AND both Boolean statements must be True for the compound statement to be True.

Example: Let x = 3 & y = 6

If x < 5 AND y > 2 Then This will evaluate to True.

OR

For the logical operator OR one or both Boolean statements must True for the compound statement to be True. Example: Let x = 3 & y = 6

If x > 2 OR y < 3 Then This will evaluate to True since x > 2 is True. Even though y < 3 evaluates to False. Only one or both statements must be True for the entire statement to be True.

NOT

For the logical operator NOT is simple. If the statements is True the opposite of True is False and vice versa.

Example: Let x = 6

If NOT(x > 4) Then Evaluates to False since x > 4 evaluates to True. Not True is False.

Logical Operators Tables

AND

Expression1 And Expression2

True And True = True

False And True = False

True And False = False

False And False = False

So the only time an AND operator evaluates to true is when both expressions are true.

OR

Expression1 Or Expression2

True Or True = True

False Or True = True

True Or False = True

False Or False = False

So if one or both expressions evaluate to true than it equals true. The only time it evaluates to false if both expressions are false.

NOT

Expression Result

Not True False

Not False True

Note that the Not changes it to the opposite.

MSGBOX

A message box is a predefined dialog box that is used to provide information to the user.

General Format

MsgBox message

The above will create a box that displays the message with an OK button to close the box and continues with the program.

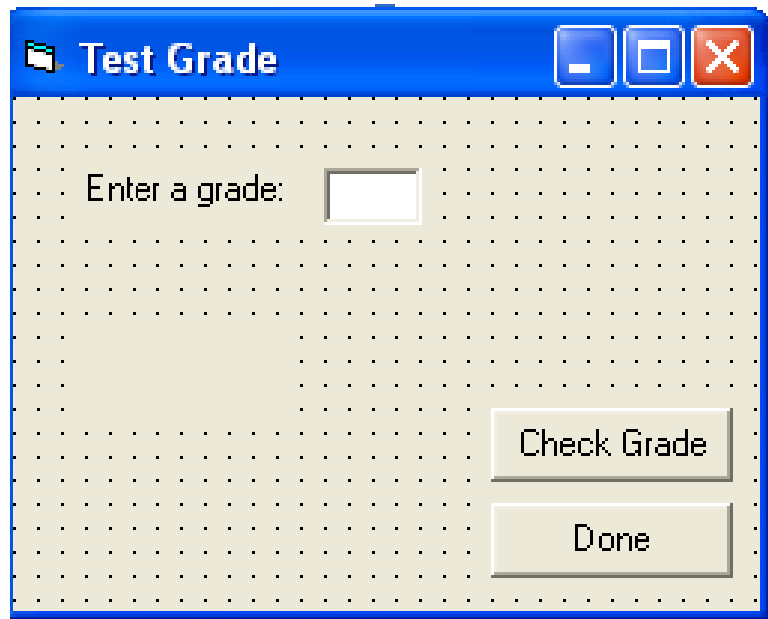
1. Create the program.

Option Explicit

```
Private Sub txtGrade_Change()  
    lblMessage.Caption = ""  
End Sub
```

```
Private Sub cmdCheckGrade_Click()  
    Dim dblGrade As Double  
    dblGrade = txtGrade.Text  
  
    If dblGrade < 0 Or dblGrade > 100 Then  
        MsgBox "Invalid test grade"  
    ElseIf dblGrade >= 70 Then  
        lblMessage.Caption = "Good job!"  
    Else  
        lblMessage.Caption = "Study more."  
    End If  
End Sub
```

```
Private Sub cmdDone_Click()  
    Unload Me  
End Sub
```



QUESTIONS:

1. Rewrite the above program so the user will input their average and the letter grade will appear. Use the grading scale 100-90 A, 80 to 89 B, 70-79 C, 60 to 69 D else F

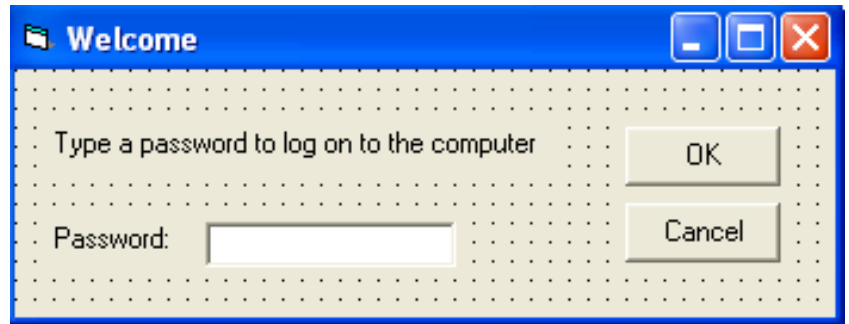
.....
PasswordChar – Allows the TextBox to hide what is being typed in the TextBox by replacing each character type with a symbol usually (*). To create a Password TextBox, go to the properties of the TextBox and select passwordchar and type in the symbol.

PROGRAM 5

1. Create the following program
2. Set the PasswordChar property in the textbox to "*".

Option Explicit

```
Private Sub cmdOK_Click()  
    Dim strPassword As String  
    strPassword = txtPassword.Text  
    If strPassword = "secret" Then  
        MsgBox "Password accepted."  
        Unload Me  
    Else  
        MsgBox "The password you entered is incorrect."  
        txtPassword.Text = ""  
    End If  
End Sub  
Private Sub cmdCancel_Click()  
    Unload Me  
End Sub
```



QUESTIONS:

1. What is the purpose of the PasswordChar property?
2. What happens if the user types the secret password?
3. Why did they put an Unload statement in the if statement?